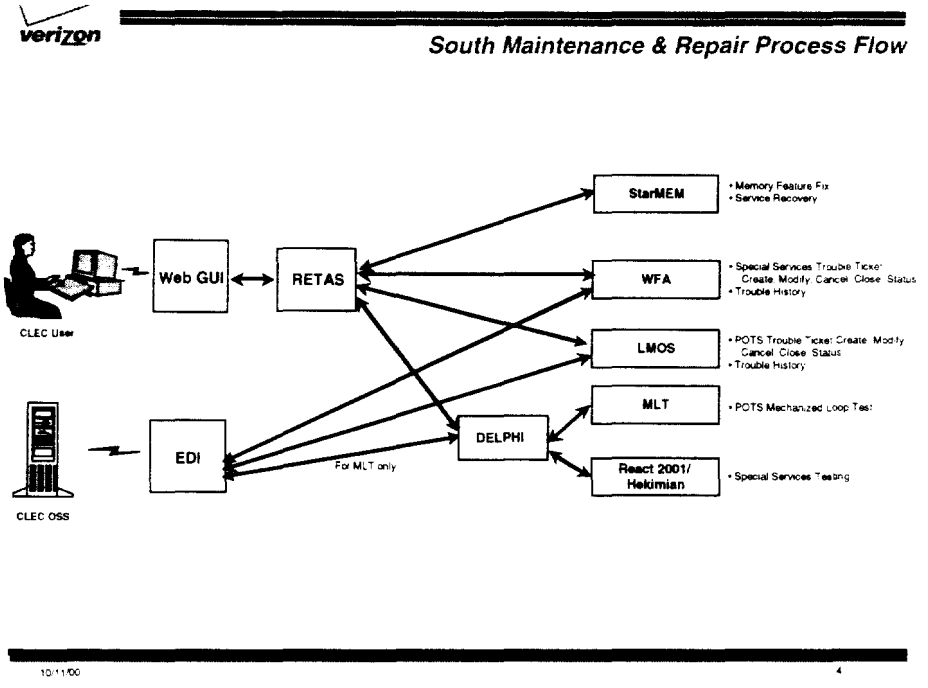
The maintenance and repair process is summarized in the diagram below.

Figure 6



Q. Which of these systems has Verizon VA modified to provide access to resellers and UNE purchasers?

A. The React 2001, WFA and DELPHI systems were modified. The React 2001 system was modified to provide the capability of testing special-services circuits and to provide the results of such tests to UNE purchasers. The WFA system was modified to give it the capability of informing field technicians of the identity of the carrier requesting the dispatch, so that those technicians could provide this information to the end user. In addition, WFA was

modified so that it could notify resellers and UNE purchasers that an order or trouble ticket has been completed or provide other status information. The DELPHI system was modified to accept and analyze testing output from resellers and UNE purchasers and forward trouble analysis results to these carriers for follow-up action.

Q. What system did Verizon develop to provide access to the maintenance and repair functionalities?

A. Verizon created a system for resellers and UNE purchasers so that they could access Verizon's maintenance and repair functions. This system is referred to as the Repair Trouble Administration System (RETAS).

Q. What maintenance and repair functionalities may be performed by resellers or UNE purchasers through access to Verizon VA's OSS?

A. Through the access systems that Verizon VA developed, UNE purchasers can initiate tests on their lines/network elements; receive the test results; create a trouble ticket; authorize the dispatch of technicians; obtain trouble history on a line/element; obtain status; and close out the trouble ticket.

5. Billing

Q. Please describe the billing functionality.

A. The billing functionality includes:

(1) Maintenance of an inventory of billable products and services;

(2) Collection of usage information;

(3) Rating (*i.e.*, applying tariffed or other applicable rates to the services utilized by customers);

(4) Bill formatting;

(5) Transmission of the data;

(6) Processing of payments; and

(7) Claims processing.

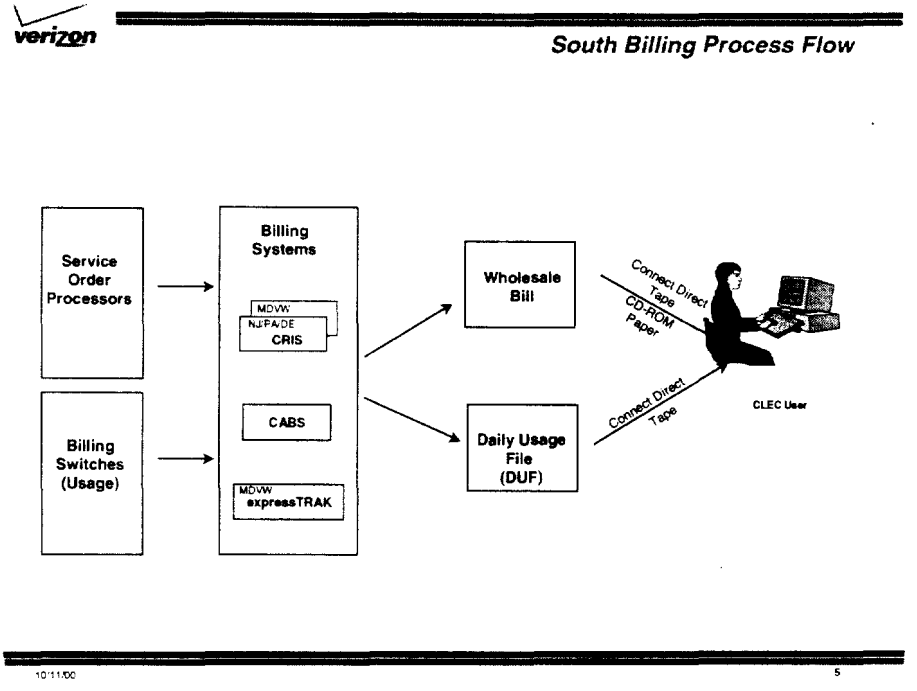
These functionalities provide CLECs with the ability to receive appropriate usage data to facilitate end user billing and to process claims and adjustments in Verizon VA's bills to CLECs.

Q. What Verizon VA systems are used to provide this functionality?

A. Verizon VA's retail and carrier access billing systems are known as ExpressTRAK, the Customer Record Information System (CRIS) and the Carrier Access Billing System (CABS). Those systems maintain CSRs, collect usage information, compute rates, generate bills, and process payments. This billing information is provided in a variety of formats, from

paper to electronic transmission. The billing process flow is summarized in the diagram below.

Figure 7



Q. Which of the systems described above were modified to make these capabilities available to resellers and UNE purchasers?

A. Both CRIS and CABS have been extensively modified to accommodate resale and UNE purchasers. The CRIS system was modified to:

(1) Provide for CLEC access to CSRs;

(2) Accept and process resale service orders;

(3) Establish an account structure that allows for multiple sub-accounts under each reseller account (thus providing detailed billing);

(4) Provide for adjustments; and

(5) Produce and format call detail records on a daily basis to resellers and UNE purchasers.

The CABS system was modified to accept and process service orders for several UNEs (interoffice facilities and trunks) and to produce billing output suitable for UNE purchasers.

D. MECHANISMS FOR ACCESS TO OSS

Q. Please describe this section of the testimony?

A. Verizon discussed above the five OSS functions and the changes required to the underlying OSS so that CLECs could utilize these functions. In order for CLECs to be able to access Verizon's OSS, Verizon also had to develop and modify the mechanisms through which CLECs interface with the OSS. This section addresses how the CLECs interface or access these OSS functions.

Q. How will Verizon VA provide electronic access to OSS functions?

A. Verizon VA offers two basic mechanisms for electronic access to its OSS. The first is through its OSS interface and gateway systems. The other is through a Network Data Mover (NDM) protocol, which (1) allows CLECs to order certain UNEs, and (2) provides them with billing information.

Q. Please describe the OSS interface and gateway systems.

A. The interface and gateway systems act as "middleware" between the CLEC and Verizon VA's core OSS and provide formats for OSS access. This middleware eliminates the need for the CLECs to train their representatives on the nuances of each separate underlying core OSS and its functionality. These systems were designed to meet CLEC requirements and industry standards reflecting those requirements.

For example, Request Manager is an electronic system that provides secure access to Verizon's ordering OSS functionality and can be utilized through either EDI formats or the Web GUI. It also provides access to pre-ordering functions utilizing EDI, Common Object Request Broker Architecture (CORBA) or the Web GUI.

Q. Please describe the EDI format.

A. EDI is an application-to-application interface used for ordering and incorporates pre-ordering functions reflecting approved national standards.

Q. Please describe CORBA.

A. CORBA is an interface used for pre-ordering functions according to approved national standards. CORBA is a standardized technology that allows applications to communicate with each other.

Q. Please describe the Web GUI.

A. The Web GUI is a format based on World Wide Web technology that enables a carrier to access Verizon VA's OSS functionality without having to develop its own systems or programs. Carriers can utilize commercially available software — such as the Netscape Navigator Web browser — to send requests to and receive responses from Verizon VA's OSS. Verizon VA receives the input from the Web GUI and converts it to the appropriate format for processing. Verizon VA also sends the responses through the Web GUI.

Q. Please describe the NDM.

A. NDM, an industry standard protocol, also provides for access to certain OSS functions. It is an alternative to the OSS interface and gateway systems described above. This protocol has been utilized historically to receive Access Service Requests (ASR) from IXCs for exchange access services. NDM supports the Bill Data Tape (BDT) format for the exchange of billing data and the Exchange Message Record (EMR) format for the exchange of usage data. This functionality was specifically requested by industry representatives. Verizon VA is not seeking recovery of any costs associated with NDM, since it already existed in an acceptable form.

E. INITIAL DEVELOPMENT COSTS

Q. What initial costs are associated with the OSS additions and modifications discussed above?

A. The initial developmental costs fall into the following categories:

(1) Expenses associated with defining the methods and procedures for OSS access;

(2) Expenses associated with developing new system interfaces or gateways and functionalities;

(3) Expenses associated with modifying the underlying core systems to accommodate the new interfaces/gateways and functionalities; and

(4) Capitalized software costs incurred since the beginning of 1999 for interface/gateway/functionality activity. These types of costs had previously been expensed but are now capitalized as a result of accounting reclassifications made pursuant to Statement of Position 98-1 from the American Institute of Certified Public Accountants.

Q. Please provide an overview of the methods used to determine the costs identified above.

A. Verizon took the following steps to identify the upfront development costs:

(1) Verizon VA identified actual 1996, 1997, 1998 and 1999 Verizon-wide dollars that were expended by the Information Systems (IS) and Network organizations to provide the functionalities described above;

(2) Verizon VA added expenses incurred by other Verizon organizations associated with determining the OSS process requirements and other common activities;

(3) The wage portion of these actual IS and Network costs, plus the added associated costs, were loaded for benefits and payroll taxes;

(4) Verizon VA determined and subtracted expenses that were tracked as part of the project, but which may be considered part of the recurring costs of the access to OSS; (These recurring costs are addressed later in this testimony.)

(5) Verizon VA projected the identified expenses to what would be incurred on January 1, 2001 for the same activities, and amortized those projections over a 10-year recovery period beginning on that date; and

(6) Finally, the amortized expenses were placed into three categories for rate setting purposes:

a. Gateway expenses which are allocable to the entire Verizon East footprint;

b. Core Network Systems that are allocable only to the Verizon

East – South footprint; and

c. Core Network Systems that are allocable to the entire Verizon East footprint.

Q. Please explain how Verizon VA assigned these costs to the appropriate categories described in the last bullet point in the previous answer.

A. Verizon VA made the following assignments:

(1) The 1996 and 1997 costs associated with changes to the Verizon East - South core network systems were assigned to the Verizon East - South only category;

(2) The 1998 and 1999 costs associated with changes to the core network systems were assigned to the Combined (North and South) category (*i.e.*, the entire Verizon East footprint);

(3) The costs associated with development of the gateway/interfaces were assigned to the Combined (North and South) category (*i.e.*, the entire Verizon East footprint).

As noted earlier, these costs were assigned to different categories because some of the activities were undertaken in only the Verizon East - South region while others were undertaken (after the Bell Atlantic-NYNEX merger) in the entire Verizon East region.

Q. You mentioned previously that you subtracted expenses that were tracked as part of the project but may be considered part of the recurring maintenance costs of the access to OSS. Why was it necessary to estimate these recurring maintenance expenses?

A. The life cycle of a software project falls into two major categories: development and maintenance. Development basically includes all of the activity needed to create a given functionality, from requirement specification to program implementation. Maintenance includes everything beyond implementation, such as work done to improve performance or other attributes, to adapt the software to changes in its environment, and to correct operational faults. The mechanisms Verizon VA used to track the expenses associated with access to OSS do not differentiate between development and maintenance. However, by the end of 1997, certain functionalities providing access to OSS were already in place. Therefore, it is reasonable to assume that some of the activity taking place in 1998 and 1999 (and the costs associated with that activity), were more properly considered "maintenance" activities, rather than "developmental" activities. Verizon VA therefore, subtracted these estimated maintenance expenses from the project development costs in those later years.

Q. How did Verizon VA estimate the portion of the tracked software expenses that were considered maintenance (and thus were subtracted from the project development costs)?

A. Verizon VA estimated the software maintenance costs by applying a factor of 15% to the one-time development expense for the appropriate years. The 15% factor is one that has been used internally for planning purposes for other Verizon software projects and is supported by numerous industry sources as a reasonable estimate of ongoing software maintenance. Ongoing costs, and the support for using the 15% factor, are described more fully later in this testimony.

Q. How did Verizon make the maintenance adjustments?

A. The ongoing maintenance associated with the development activity in 1996 and 1997 was adjusted out of the 1998 tracked costs to determine development costs for 1998. Similarly, the maintenance was adjusted out of 1999 tracked costs to determine development costs for 1999. This was done to ensure that there would be no double recovery of these ongoing maintenance costs (*i.e.*, to ensure that the 15% factor was applied only to development costs and not to a combination of development and maintenance costs).

Q. How did Verizon VA allocate the overall initial development costs associated with providing resellers and UNE purchasers access to Verizon's OSS?

A. VZ-VA CS, Vol. VIII, Part F-5, Workpaper 4, Page 1, Column D breaks down the directly attributable expenses into Gateway/Interface and Verizon East - South Core Network System costs for 1996 and 1997. The same workpaper shows a similar breakdown of directly attributable expense into Gateway/Interface and Verizon East (Combined North and South) Core Network System costs for 1998 and 1999.

Q. Why is this allocation method appropriate?

A. The categories represent the functional groupings from which the relevant customer base derives the benefit. That is, CLECs and resellers across the Verizon East footprint will make use of the Gateway/Interfaces developed in both regions for all the years, and they will make use of the core network system development activities done in 1998 and 1999.

Conversely, only Verizon East – South CLECs and resellers need the modifications that were made to the Verizon East - South core network systems made in 1996 and 1997. Verizon's cost recovery proposal is designed to recover costs only from customers that benefited from the developments and modifications. Here, Virginia CLECs benefited from the

developments and modifications made across the Verizon East footprint and from those made only in the Verizon East – South region.

Q. What types of expenses are included in these figures?

A. All tracked and projected expenses related to these OSS categories are included, with the exception of items such as labor loadings, which are discussed below.

Q. How did Verizon VA identify these expenses?

A. For work performed by vendors, Verizon VA totaled the costs charged by these vendors. For work performed by Verizon VA employees, Verizon VA used the expenses reported in Verizon VA's financial systems, which calculated the costs based on the number of hours worked from employee time sheets.

Q. You said before that the Access to OSS development costs were made more forward-looking by projecting 1996-1999 costs forward. Please explain.

A. Verizon recalculated the 1996-1999 costs for labor and contractors as if they had been expended, all at once, on January 1, 2001. (See VZ-VA CS, Vol. VIII, Part F-5, Workpaper 4, Page 5.) Because Verizon is seeking recovery

of these costs now, it is appropriate to project these costs forward to 2001 to account for increases in productivity and inflation that would have changed the costs of these activities had they been undertaken in 2001. The effect of projecting these costs forward to 2001 is to lower these costs by approximately $6 million.

Q. How was the estimate of labor costs projected?

A. All labor-related expenses have been projected to January 1, 2001 through the application of productivity indices and estimates of percentage wage increases. (See VZ-VA CS, Vol. VIII, Part F-5, Workpaper 4, Page 5.) Similarly, expenses associated with vendor activities have been projected to January 1, 2001 through the application of consumer price indices (CPI-W) and productivity indices. The productivity indices are based on actual data for 1997, 1998, and 1999, as reported by the U.S. Bureau of Labor Statistics Productivity Gains for the Non-Farm Business Sector. (See VZ-VA CS, Vol. VIII, Part F-5, Workpaper 4, Page 5.) Therefore, the cost study assumes that the overall work content identified on the basis of these prior years is a reasonable basis to project the forward-looking activity that would be required to develop the access to OSS, and it bases the total level of necessary expenditures on these costs after adjusting for inflationary and productivity factors.

Q. Does the Access to OSS Cost Study include other initial development expenses not identified above?

A. Yes. Portions of the 1996 and 1997 data reported above include only work done by the Information Systems and Network organizations. Verizon incurred additional costs associated with time spent by other Verizon organizations to develop the process requirements for the OSS and to perform other common activities. These additional costs were specifically reported in Verizon East – North, but not in Verizon East – South.

Verizon VA therefore estimated this category of costs for Verizon East - South by examining the ratio between the costs associated with the Verizon East – North Information Systems and Network organizations and the costs associated with the other pertinent Verizon East – North organizations on a project-wide basis. This calculation is contained in VZ-VA CS, Vol. VIII, Part F-5, Workpaper 4, Page 1. This ratio was then multiplied by the Verizon East – South costs to produce an estimate of the OSS development costs incurred by Verizon South – East organizations other than the Information Systems and Network organizations.

Q. You previously mentioned that you applied loadings for benefits and payroll taxes. Why was that necessary?

A. The actual and budgeted expenses reported by various organizations include wages but do not include benefits and payroll taxes. Verizon VA therefore added a loading to the reported expenses for employee benefits and payroll taxes to obtain the total labor-related cost.

Q. What other steps did Verizon take to calculate the development expenses?

A. Verizon VA amortized the total development expenses over 10 years, as discussed above.

Q. Please explain how Verizon VA performed the calculation to amortize total development expenses over 10 years.

A. In order to spread the total estimated initial development expenses over 10 years, a Continuous Annuity from a Present Amount factor, as defined in Appendix B of *Engineering Economy, A Manager's Guide to Economic Decision Making*, 3rd Edition, was multiplied against the forward-looking incremental costs that have been expressed in terms of January 1, 2001 dollars. This factor reflects the appropriate cost of money, as discussed elsewhere in this testimony.

Q. Did Verizon apply other factors after the costs were amortized?

A. A Gross Revenue Loading factor was applied to yield a final result. The Gross Revenue Loading factor is discussed in more detail in the cost factor section of this testimony.

Q. Were any other adjustments made to the development costs prior to the final determination of rates?

A. Yes. An adjustment was necessary to reflect that the Retail Avoided Cost Discount percentage for resold services previously approved in Virginia because that discount included an offset for a preliminary estimate of a subset of the access to OSS functionality. As a result, Verizon VA has already obtained a small amount of cost recovery. This recovery authorized in Virginia is prorated up for the rest of Verizon East – South and subtracted from the development costs for which recovery is sought in this case.

Q. How did Verizon determine how much should be subtracted for this offset?

A. The calculation of the offset is set forth in VZ-VA CS, Vol. VIII, Part F-5, Workpaper 4, Page 14.

F. OSS ONGOING COSTS

Q. Please describe the OSS ongoing costs.

A. Verizon must continually maintain and update the software and hardware associated with providing CLECs with access to Verizon's OSS. The ongoing costs generally fall into two categories. The first category includes the annual capital and operating costs associated with the computer hardware that provides access to OSS. The second category includes software maintenance. These costs are recurring in nature, and they will continue for as long as access to OSS must be provided to requesting CLECs and resellers.

Q. Please provide an overview of how Verizon VA calculated ongoing capital and maintenance costs.

A. Verizon VA identified computer investment requirements; applied appropriate cost factors to develop annual costs for these computers; added estimated ongoing maintenance activity expenses associated with the continuing support of the initial software development effort; and assigned the costs to Verizon East – South specific or Verizon East combined categories in a manner similar to the development costs described above.

1. Capital Costs

Q. Please explain the ongoing capital costs in more detail.

A. In order to provide access to OSS, Verizon VA has to have available the required computer equipment. The ongoing costs reflect the annual carrying cost of the capital investment needed to provide access to Verizon VA's OSS. The capital costs include the capital-related and other associated costs for the share of general purpose computer investment used in providing CLECs with access to OSS. These ongoing capital costs are above and beyond the development costs for the interfaces and functionalities themselves.

Q. What are general purpose computer investments?

A. The general purpose computer investment is comprised of equipment such as storage devices, controllers, routers, servers, concentrators, workstations, memory, processors and other items. The costs for such equipment include all of the associated hardware such as power requirements and coupling facilities. Much of the equipment is used for systems serving Verizon VA as well as resellers and UNE purchasers and is bought in bulk. For example, storage capacity (measured in gigabytes of memory or GIGS) and processing capacity (measured in millions of instructions per second or MIPS) are used for Verizon VA's purposes as well as for providing CLECs with access to OSS. Because of the "lumpy" nature of such computer equipment (*i.e.*,

because equipment is bought in large discrete chunks of capacity), these costs must be calculated on a capacity basis.

Q. How did Verizon VA calculate these capacity-based costs?

A. Verizon VA calculated the costs per GIG and per MIPS based upon the total corporate budget for that year. However, to present the most forward-looking view of these costs and address the issue of historically declining GIGs and MIPS cost, MIPS and GIG capacities for 1996, 1997, 1998, and 1999 were costed at 1999 rates, at which time the access to OSS UNE was fully available. Therefore, for each of the years 1996 through 1999, the estimate of $600 per GIG and $10,000 per MIPS was used. These amounts reflect a significant reduction from the $3,000 per GIG and $25,000 per MIPS actually incurred by Verizon VA in 1996. These hardware requirements and associated costs are developed by Verizon's Data Center, Network, and Distributed Resources (DCNDR) group, adhering to a rigorous process and set of guidelines. Verizon's DCNDR group has achieved ISO 9002 certification, which is the international quality measurement standard specific to quality assurance for systems production, installation and servicing.

Q. What are the total capital expenditures?

A. The total capital expenditures for OSS access and functionalities are as shown in VZ-VA CS, Vol. VIII, Part F-5, Workpaper 4, Page 6. The investments associated with the mid-range computer equipment providing the actual gateway functionality (for example, servers and routers) are based on vendor invoices. The Applications Planning group within the DCNDR organization estimated the cost of the additional mainframe equipment attributable to resellers and UNE purchasers.

Q. What steps did Verizon VA take to ensure that only the capital costs incurred to provide the access to OSS functionalities described above are included in the amounts Verizon VA proposes to recover from resellers and UNE purchasers?

A. All of the mid-range equipment was and is needed for the interfaces and gateways and is dedicated solely for this purpose. Verizon VA therefore has included all costs of such equipment in the amount to be recovered from resellers and UNE purchasers. With respect to the mainframe equipment associated with Verizon VA's core network systems, Verizon VA first identified the annual baseline growth requirements associated with the systems that house the applications in question. It then overlaid the requirements brought on by the increased demand and functionalities that are

attributed to the resellers and UNE purchasers. Only these attributed incremental requirements have been incorporated into this filing.

Q. How did Verizon VA calculate the annual costs related to general purpose computer investments?

A. To estimate the annual costs for general purpose computer investments necessary to provide access to OSS, Verizon VA applied an ACF specifically developed for the general purpose computer investment in this study.

2. Software Maintenance

Q. Please explain the ongoing software maintenance costs.

A. As noted above, even after software has been developed and implemented, a firm continues to incur maintenance expenses for, among other things, work done to improve software performance, adapting software to changes in its environment, and correcting operational faults.

Q. How were the ongoing software maintenance costs determined?

A. As noted earlier, Verizon VA used a factor of 15% of initial program development costs to estimate the annual ongoing maintenance costs of supporting the initial development effort. These ongoing efforts include program upgrades, enhancements, and modifications. The calculations are

shown in VZ-VA CS, Vol. III, Part F-5, Workpaper 4, Page 3. Substantial data from industry experts demonstrates the reasonableness of the 15% factor.

Q. Please describe the information that validates the 15% factor.

A. Five independent industry sources are presented to support the reasonableness of Verizon VA's 15% factor.

Q. Please describe the first source supporting Verizon VA's maintenance factor.

A. The first source is from a presentation given by Dr. Charles Engle, Former Director of the ADA Joint Program Office of the Center for Computer Systems Engineering of the Joint Interoperability and Engineering Organization of the Defense Information Systems Agency. On page 37 of the presentation, Dr. Engle highlights the fact that 60% to 80% of a software system's life cycle costs occur during the maintenance phase. The relationship between Dr. Engle's data (and the supporting data from the other four sources) and the 15% factor is discussed in more detail below.

Q. Please describe the second source of supporting information.

A. The second source is from the introduction to a document prepared by the Software Engineering Institute at Carnegie-Mellon University, which states that maintenance activities account for 50% to 70% of a software system's life cycle costs.

Q. Please describe the third source of supporting information.

A. The third is from a document by Dr. Patricia K. Lawlis, the co-owner of a computer systems and software engineering consulting firm, outlining guidelines to be followed in choosing a computer language. She states that maintenance of software usually costs two to four times the cost of developing the software in the first place.

Q. Please describe the fourth source of supporting information.

A. The fourth source is from an article written by Dr. Alan Salisbury, President of Learning Tree International, an independent professional information technology training organization. Dr. Salisbury states that 70% to 80% of a software system's life cycle costs occur during the maintenance phase.

Q. Please describe the final source of supporting information.

A. The fifth source is from a book entitled *The Object Technology Revolution* by Michael Guttman and Jason R. Matthew (John Wiley & Sons, Inc., 1995).